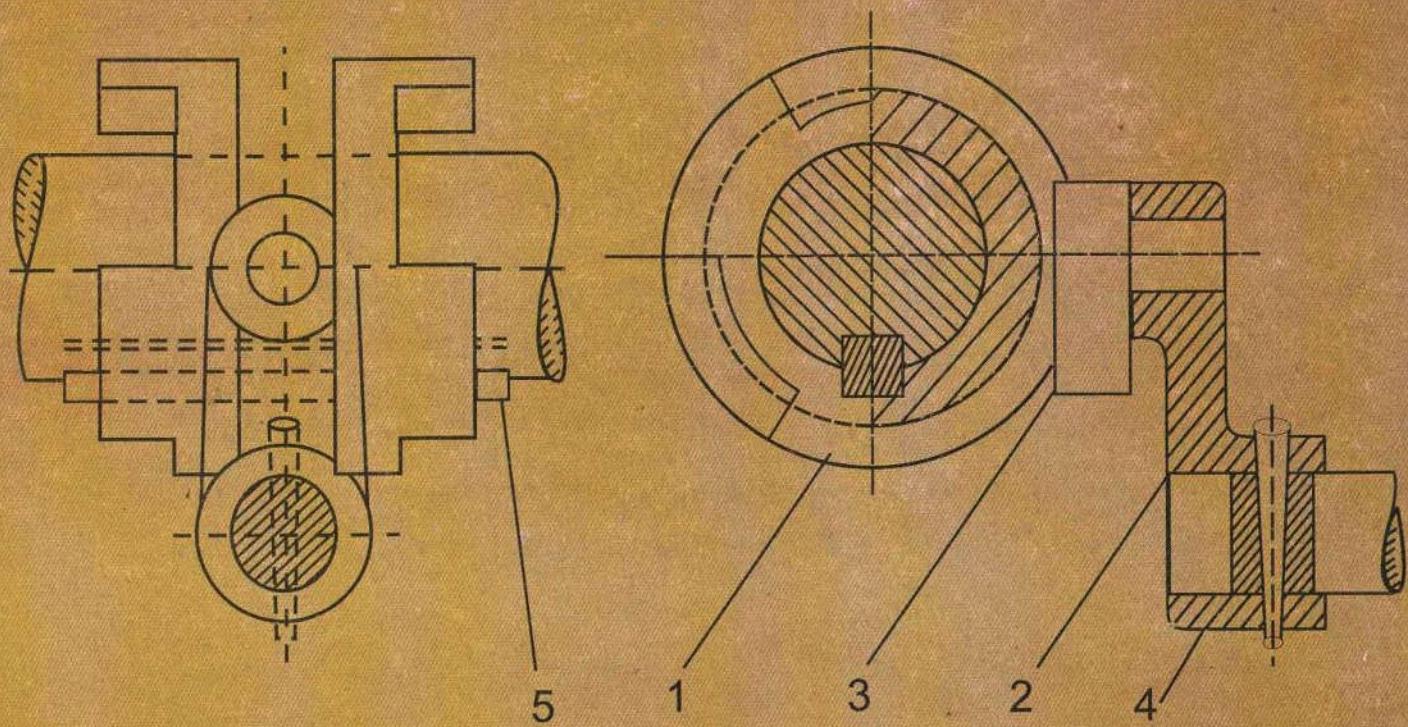


TECHNICAL DRAWING 2

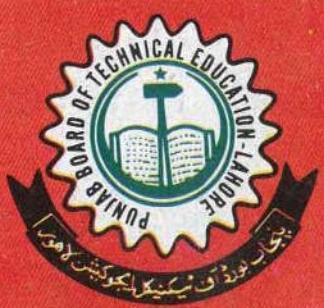
METAL TRADES



GOVERNMENT OF THE PUNJAB
TECHNICAL EDUCATION & VOCATIONAL TRAINING AUTHORITY
PUNJAB BOARD OF TECHNICAL EDUCATION
TRADE TESTING CELL, LAHORE.

T.T.P. Series No.8

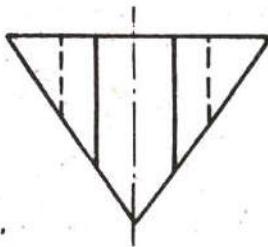
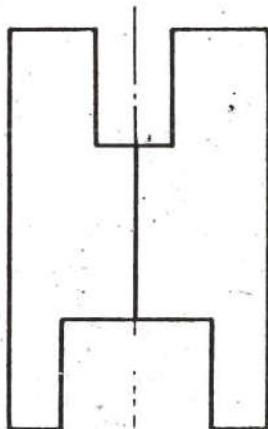
Price Rs. 30/-



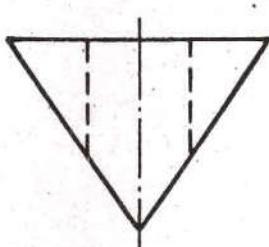
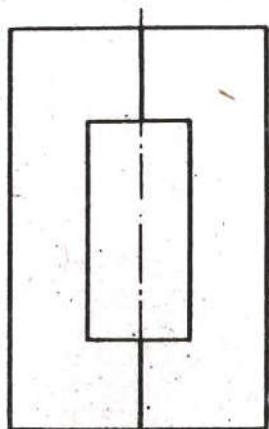
Rectangular Cuts on Prisms with Triangular Base

Exercise: Sketch the side view of each of these objects.

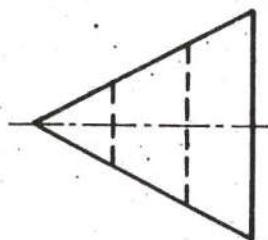
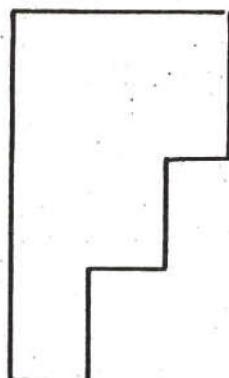
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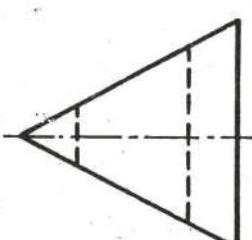
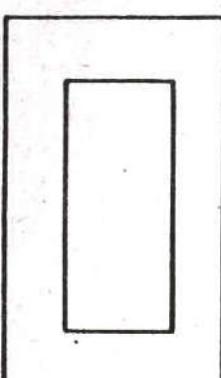
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3



4



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

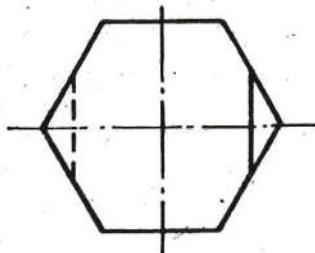
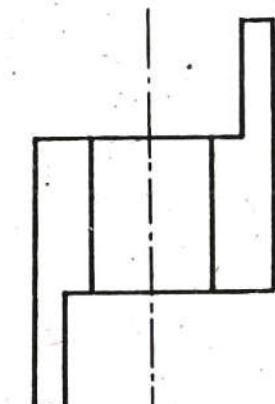
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 50

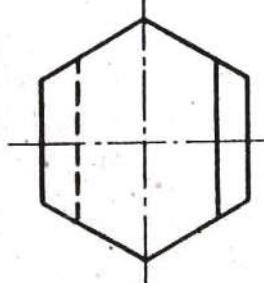
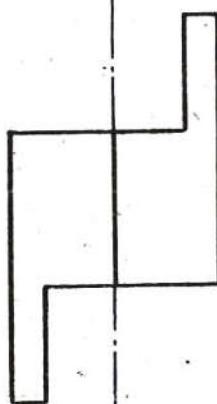
Rectangular Cuts on Prisms with Hexagonal Base

Exercise: Sketch the side view of each of these objects.

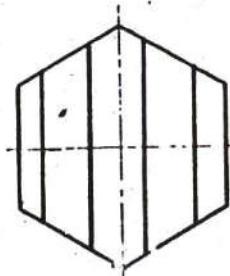
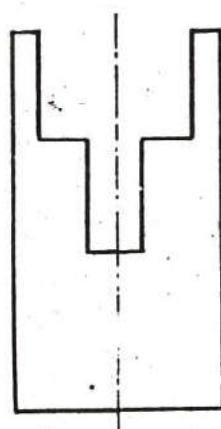
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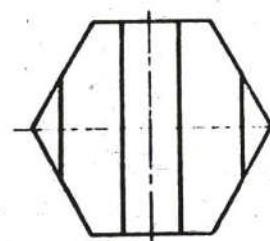
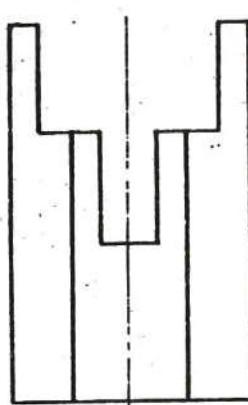
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3



4



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 51

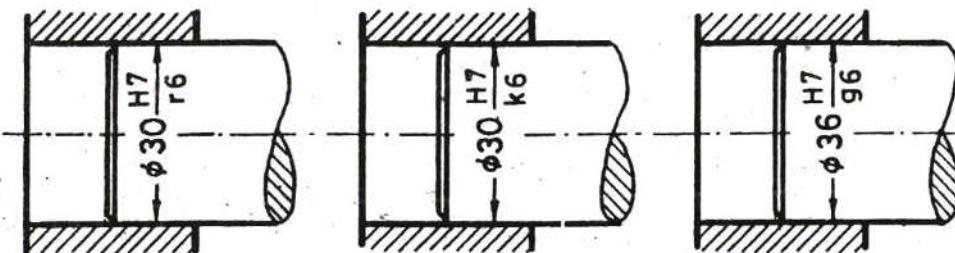
Technical Representation of Fits

Table of Off-Sizes

Nominal Size (mm)	ISO SYMBOL	Off-sizes (mm)	Upper-and lower Limiting case	TYPE of FIT
φ 30	H7	+0.021 0	1 min. Interference	-----
	r6	+0.041 +0.028	2 max. Interference	
φ 30	H7	+0.021 0	1 max. Clearance	-----
	k6	+0.015 +0.002	2 max. Interference	
φ 30	H7	+0.021 0	1 max. Clearance	-----
	g6	-0.007 -0.020	2 min Clearance	

Exercise:

Under the heading 'Type of Fit' enter the words:

CLEARANCE-FIT

INTERFERENCE-FIT

TRANSITION-FIT

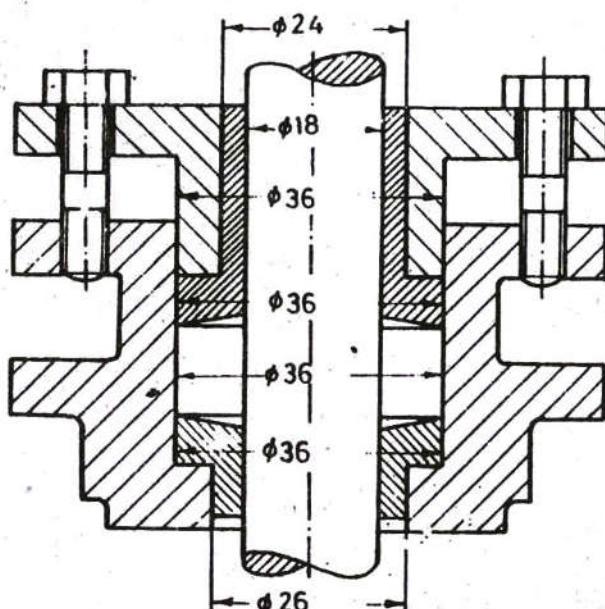
in the correct place.

Note: The ISO-symbols for holes (capital letters) stand high !
The ISO-symbols for shafts (small letters) stand low !

Exercise:

Enter the ISO-symbols of the fits from the table in the drawing of the Packing Box !

Nominal size	Fits	
	Hole	Shaft
φ 18	H7 +0.018 -0.008	h9 +0.034 -0.023
φ 24	H8 +0.033 -0.000	h9 0 -0.052
φ 26	H8 +0.033 -0.000	h9 0 -0.052
φ 36	H8 +0.039 -0.000	h9 0 -0.062



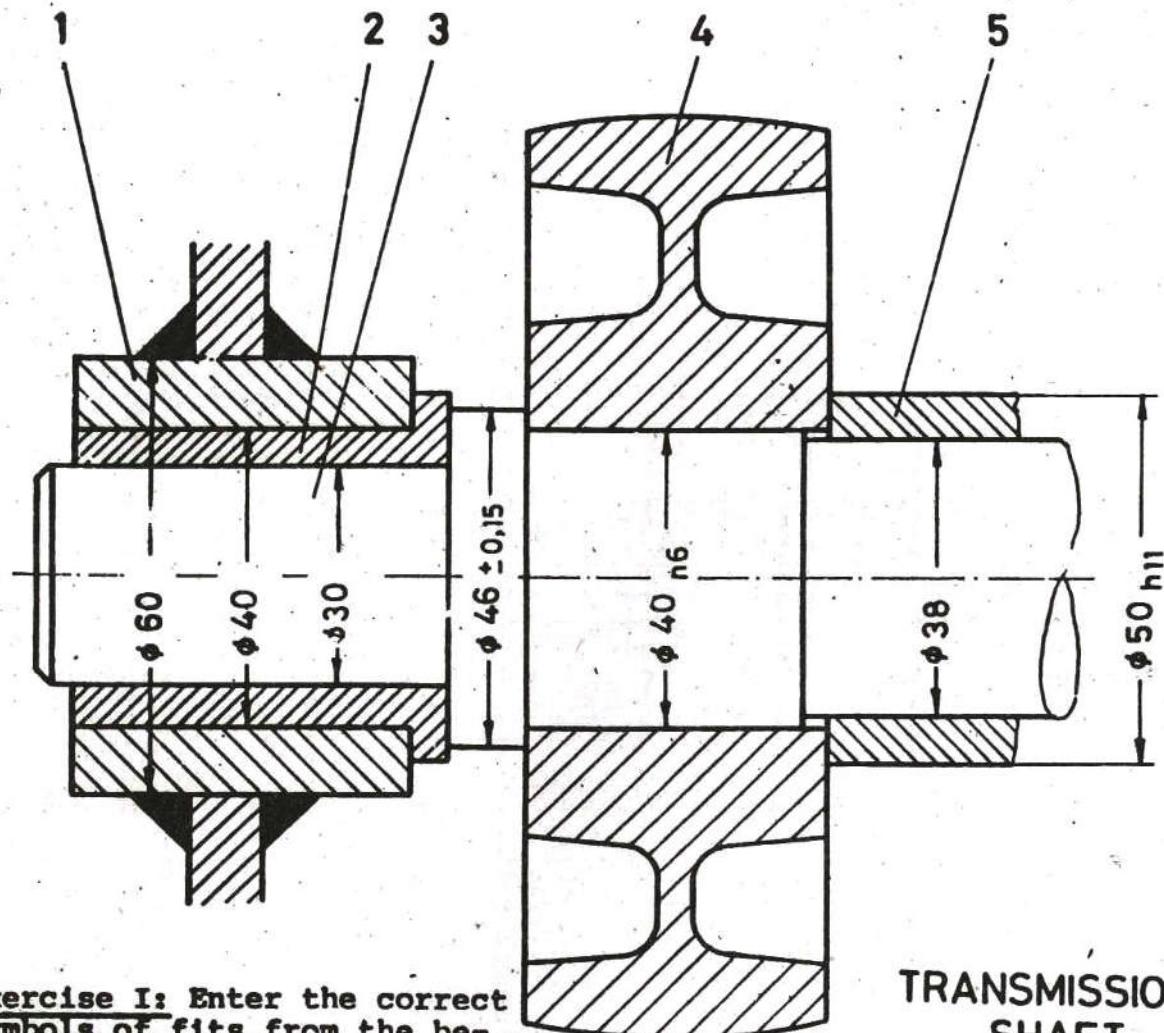


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Types of Fits

5



Exercise I: Enter the correct symbols of fits from the below table behind the nominal sizes in the above drawing.

**TRANSMISSION
SHAFT
M 1:1'**

Nominal Size (mm) with Fit	30 E9	30 h9	38 H7	38 h6	40 H7	40 n6	40 r6	50 h11	60 h9	60 H8
Off- Sizes	+92 /40	0 -52	+25 /0	0 -16	+25 /0	+33 /17	+50 /34	0 -160	0 -74	+46 /0

Exercise II: Cross the correct Type of the Fits with the help of the above table.

Type of Fit	Fit	60 H8 h9	40 H7 r6	30 E9 h9	40 H7 n6	38 H7 h6
Force-Fit						
Transition-Fit						
Clearance-Fit						



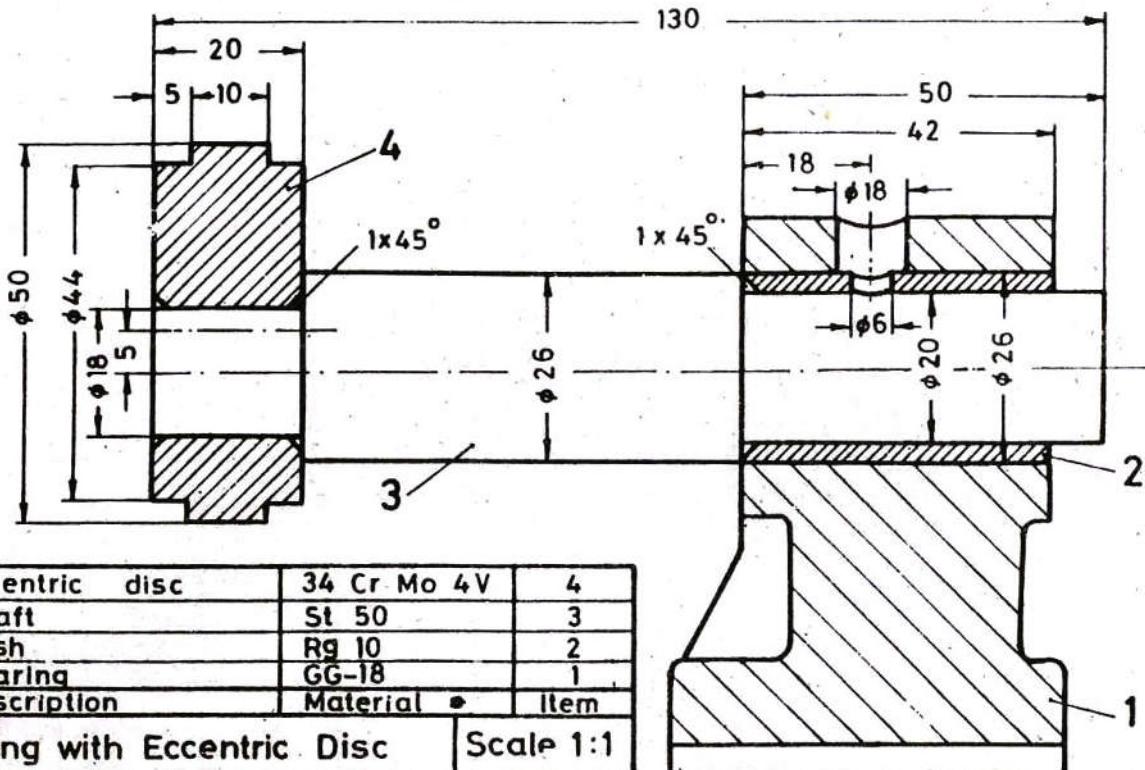
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 53

Specification of Fits in the drawing

6



Exercise: Draw parts 2, 3, 4 (2 & 4 sectioned) with all dimensions.

Add tolerance-symbols and surface-symbols according to table.

	Part 2		Part 3		Part 4
	Ø 20	Ø 26	Ø 20	Ø 18	Ø 18
Tolerances	H7 ($\frac{+21}{0}$)	n6 ($\frac{+28}{+15}$)	f7 ($\frac{-20}{-41}$)	s6 ($\frac{+39}{+28}$)	H6 ($\frac{+11}{0}$)
Surfaces	surfaces with tolerances: vvv other: ▽		surfaces with tolerances: vvv other: ▽		hole:vvv faces:▽ other:▽▽

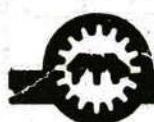
3

2

4

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



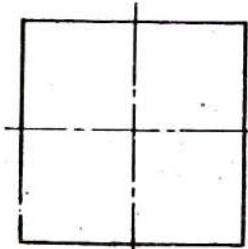
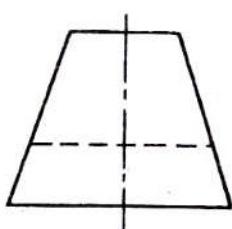
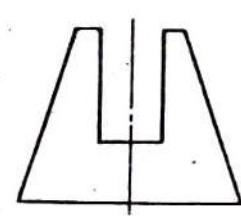
Technical Drawing
No. 54

Rectangular Cuts on Pyramids

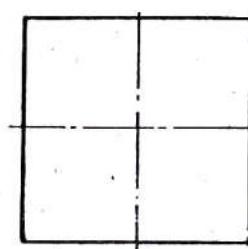
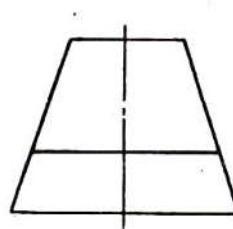
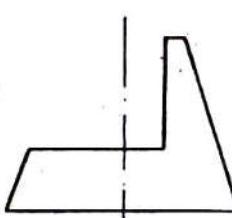
7

Complete the plan view of each of these objects (sketch)

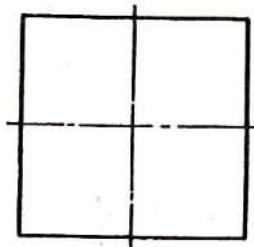
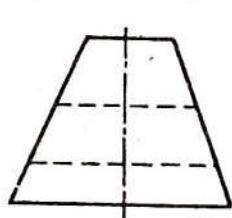
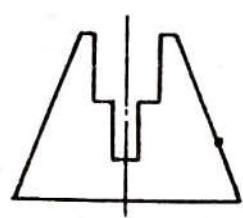
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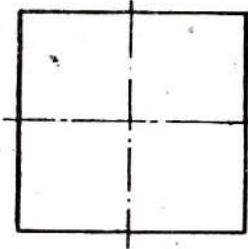
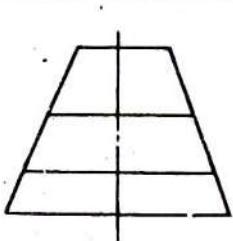
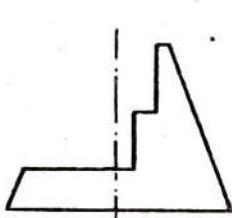
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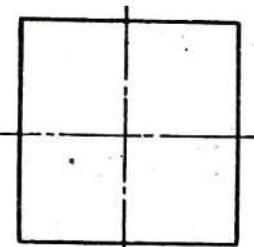
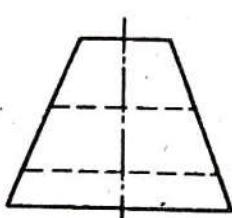
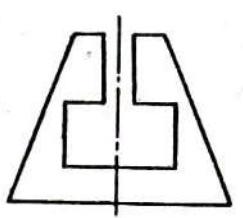
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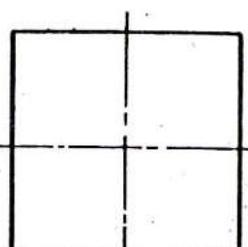
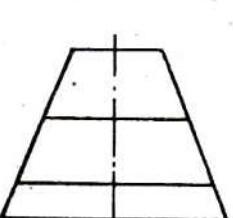
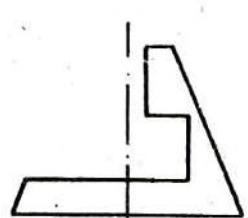
4



5



6



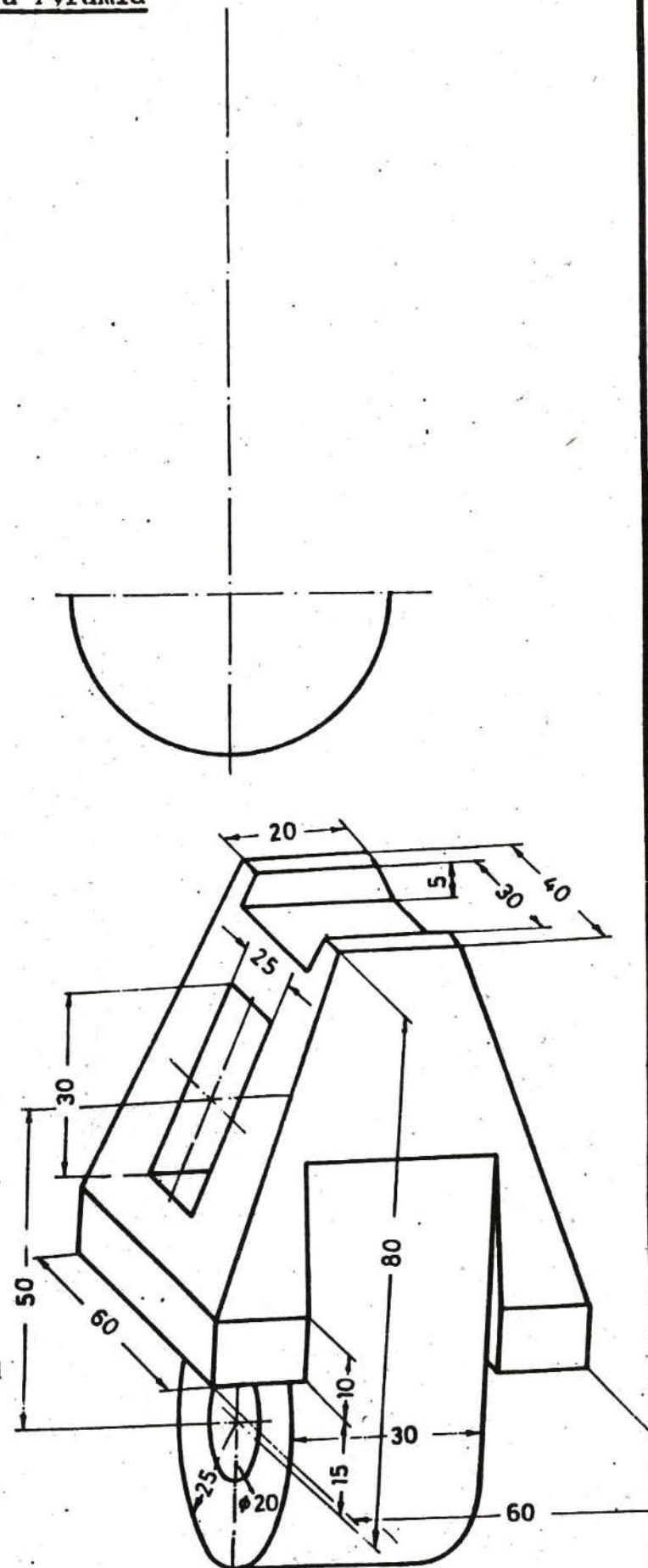
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 55

Job with Rectangular Cuts on a Pyramid

9



Exercise: Prepare a free hand sketch of the TOGGLE LINK in 3 views with all dimensions.

Scale 1:1

Bore hole: $20^{\text{S}7}$, △△△

Rectangular hole: $+0.2$, △△

Slot: $30^{\text{H}7}$, △△△

All other surfaces: ▽

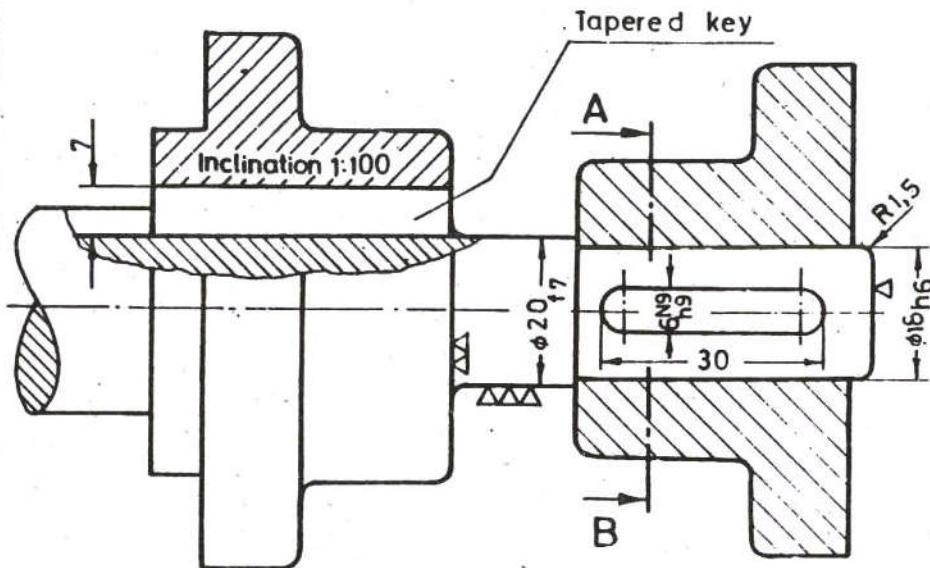


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

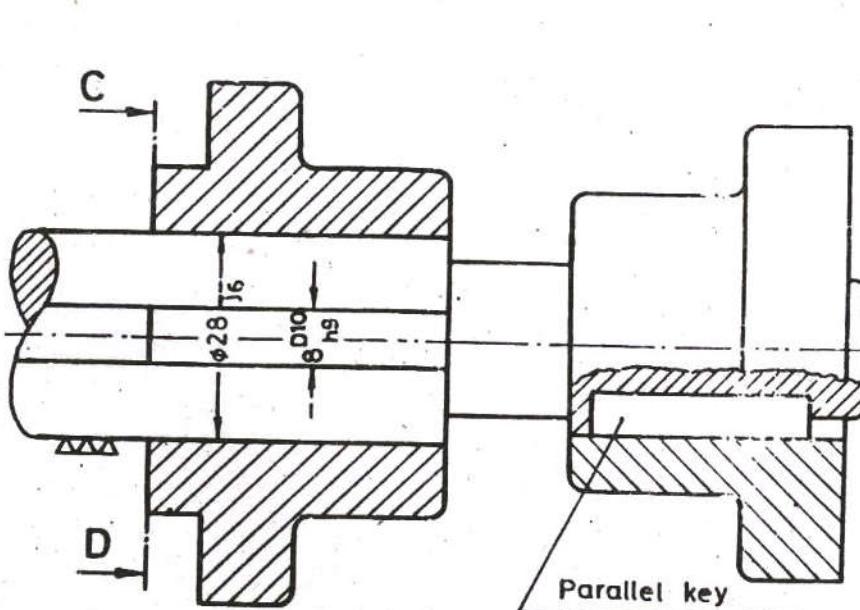
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 56

Parallel and Tapered Keys



Section A-B



Section C-D

Exercise:

1. The bearing surfaces of a parallel key are
.....
2. The bearing surfaces of a tapered key are
.....
3. The cross-section of the has to be drawn
with clearance at the bottom face of the keyway of the hub.
4. In the representation of the the inclination
(mostly 1:100) has to be entered.

Note: Keys are hatched only in cross-sectional representation
(see section A-B).



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 57

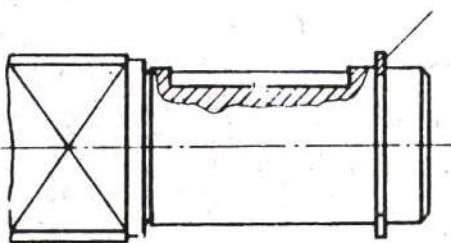
Parallel Keys

Exercise:

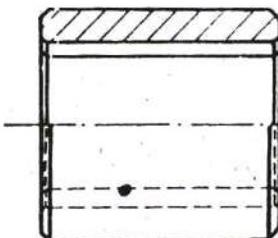
Prepare a full scale assembly drawing of the parts.

Shaft

Locking ring



HUB



Parallel key 14x9x63

St 50K



SCALE 1:2,5

SCALE 1:1



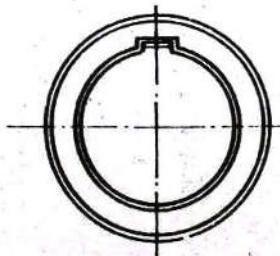
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

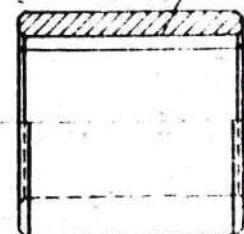
Technical
Drawing
No. 57.1

Tapered Keys

HUB



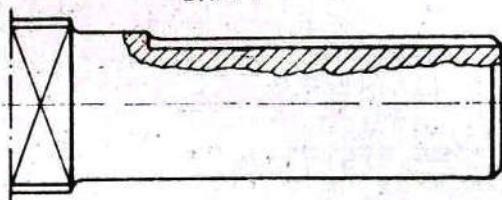
Inclination 1:100



Exercise:

Prepare a full scale assembly drawing of the three parts.

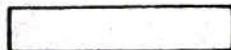
SHAFT



Tapered key 14x5x70



SCALE 1:2,5



SCALE
1:1

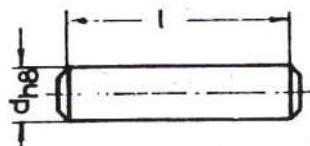
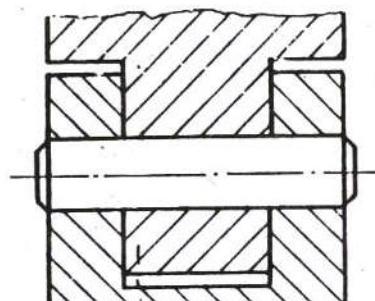
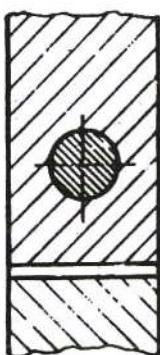


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

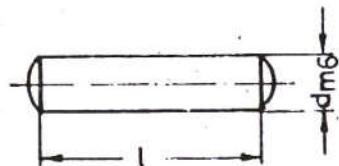
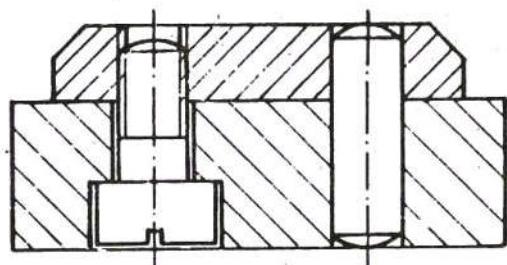
Technical
Drawing
No. 57.2

Pin - Joints



Coupling Pin

example: $4_{\text{h}8} \times 20$



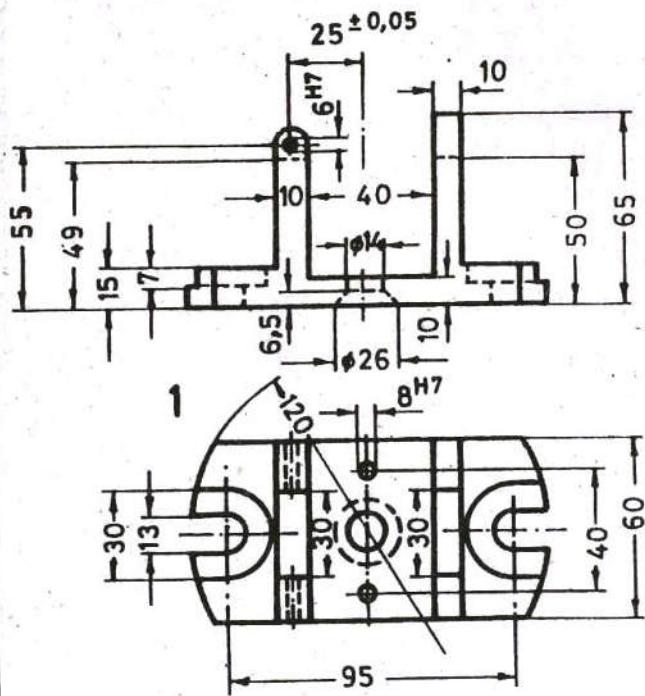
Fitting Pin

example: $6_{\text{m}6} \times 20$

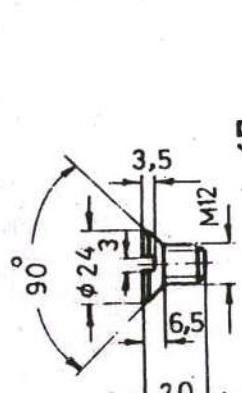
Note: Pins are only hatched in cross-section!

Coupling Pins have flat ends - Fitting Pins have rounded ends.

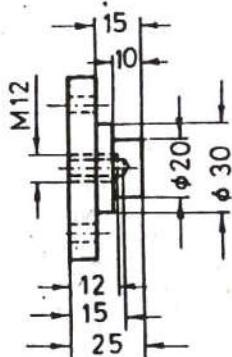
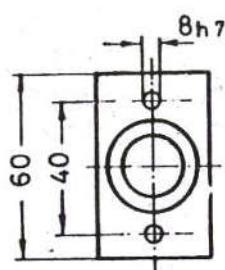
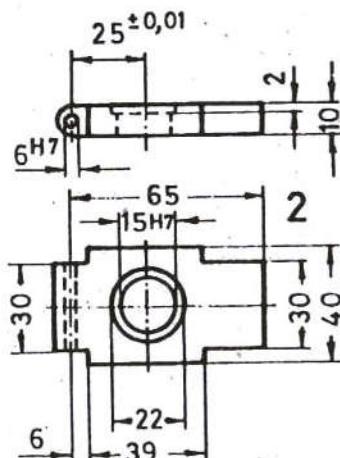
Exercise: Parts below belong to a Drilling Jig. Complete the assembly drawing on sheet 58.1 in 3 views without dimensions; elevation and side view sectioned. Take the pin dimensions from the list of parts. Drilling bush (part 3) as already given.

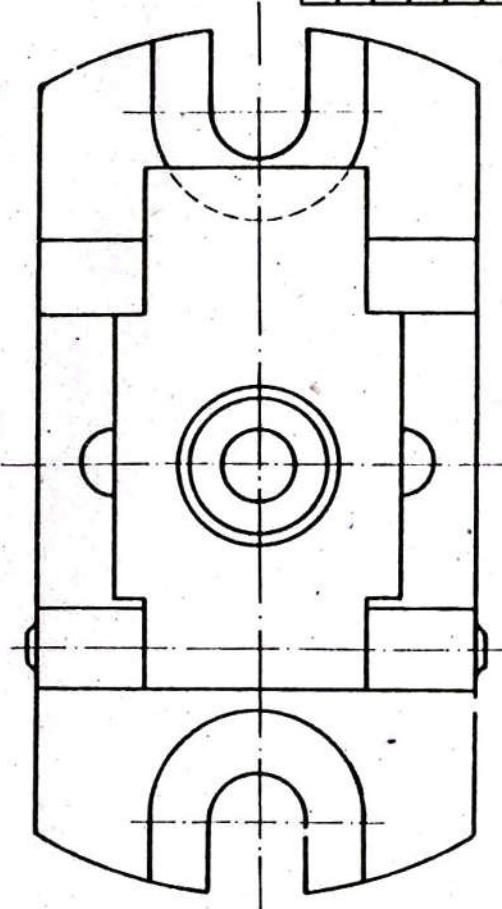
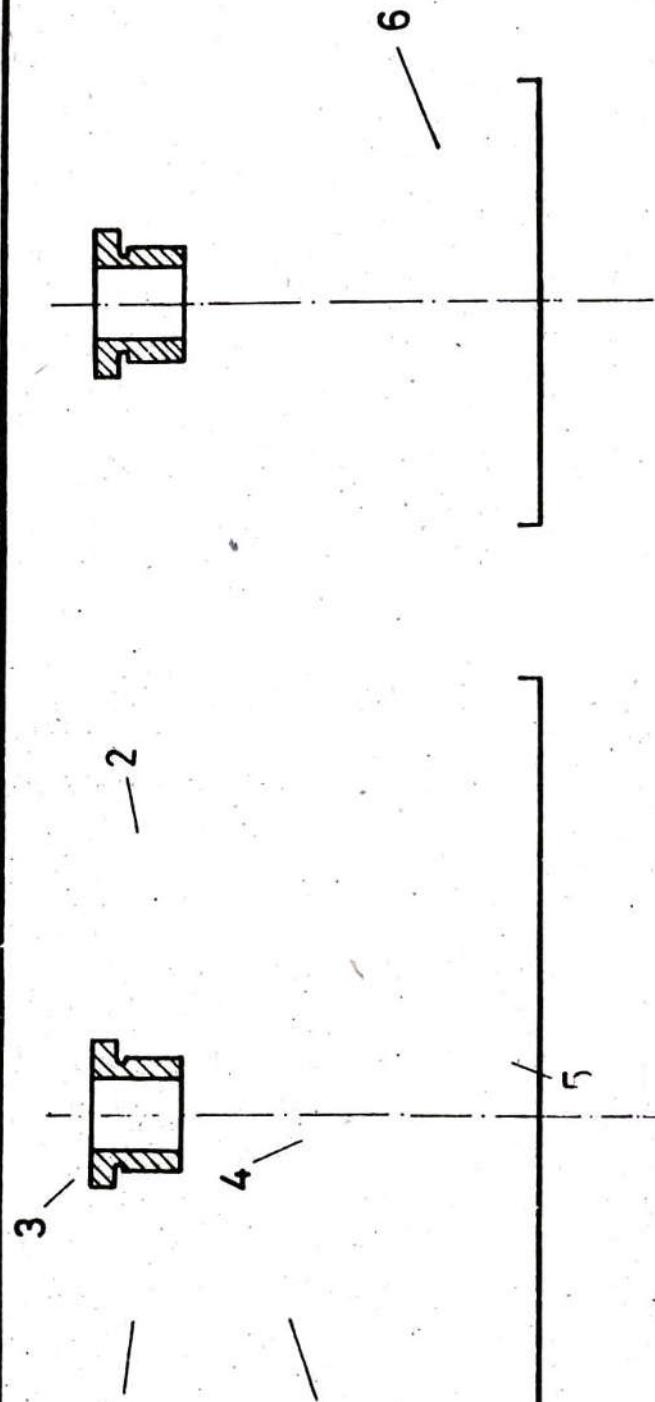


Scale 1:2,5



5





No.	Description	Material Item
1	Cylindrical Pin 6n8 x 60	St. 50
2	Cylindrical Pin 8m6 x 18	St. 50
1	Countersunk Screw M12 x 20	5D
1	Worksupport	St. 34
1	Drilling bush A 10 x 12	3
1	Cover	St. 34
1	Base	St. 34
		Material Item

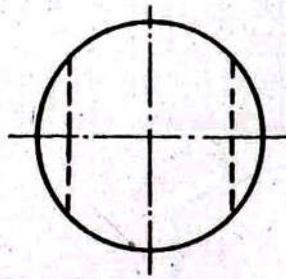
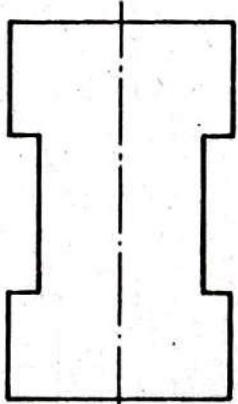
Drilling Jig Scale. 1:1



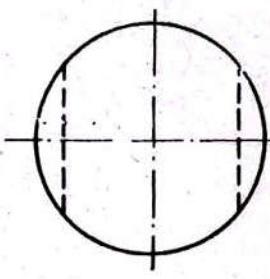
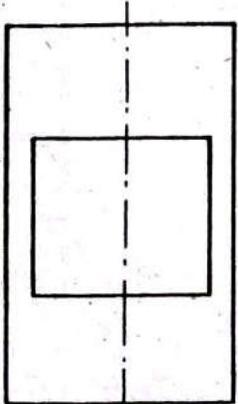
Rectangular Cuts on Cylinders

Exercise: Sketch the side view of each of these objects.

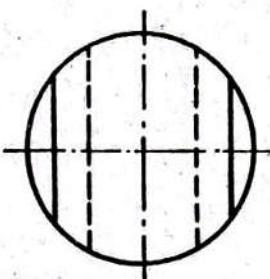
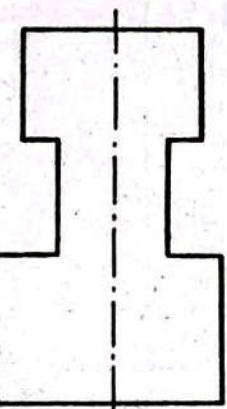
1



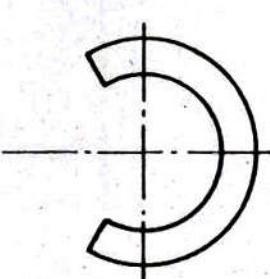
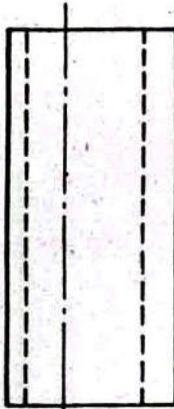
2



3



4



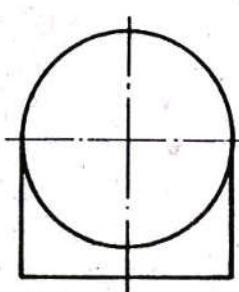
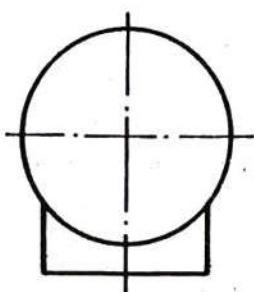
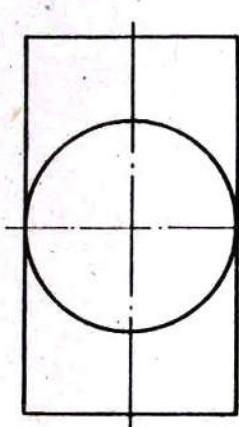
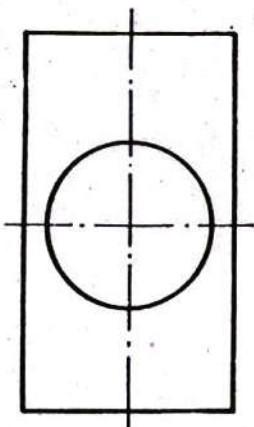
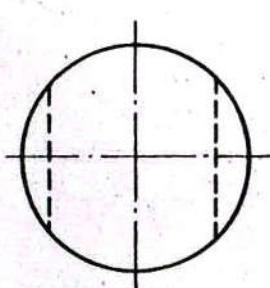
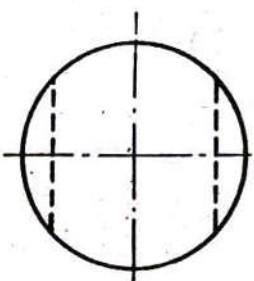
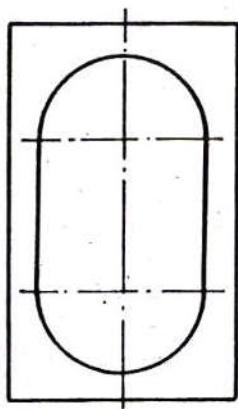
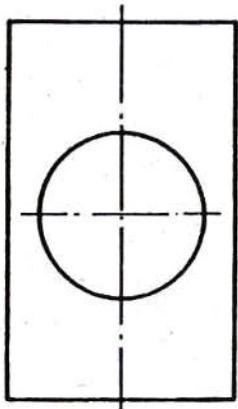
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 59

Penetrations of Cylinders

Exercise: Sketch the side view of each of these objects.



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

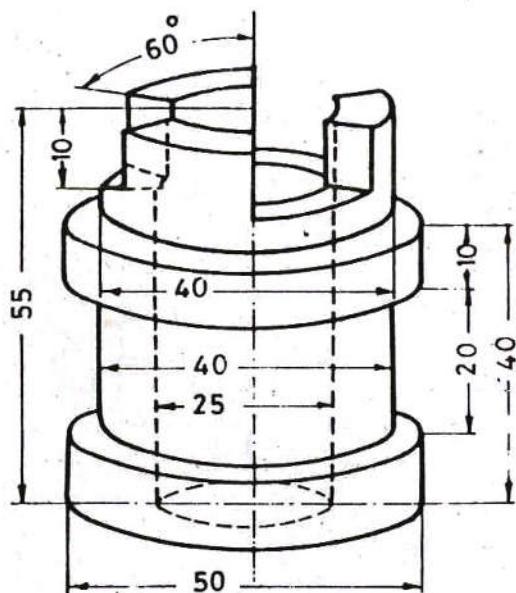
Technical
Drawing
No. 60

Cylindrical Job with Rectangular Cuts

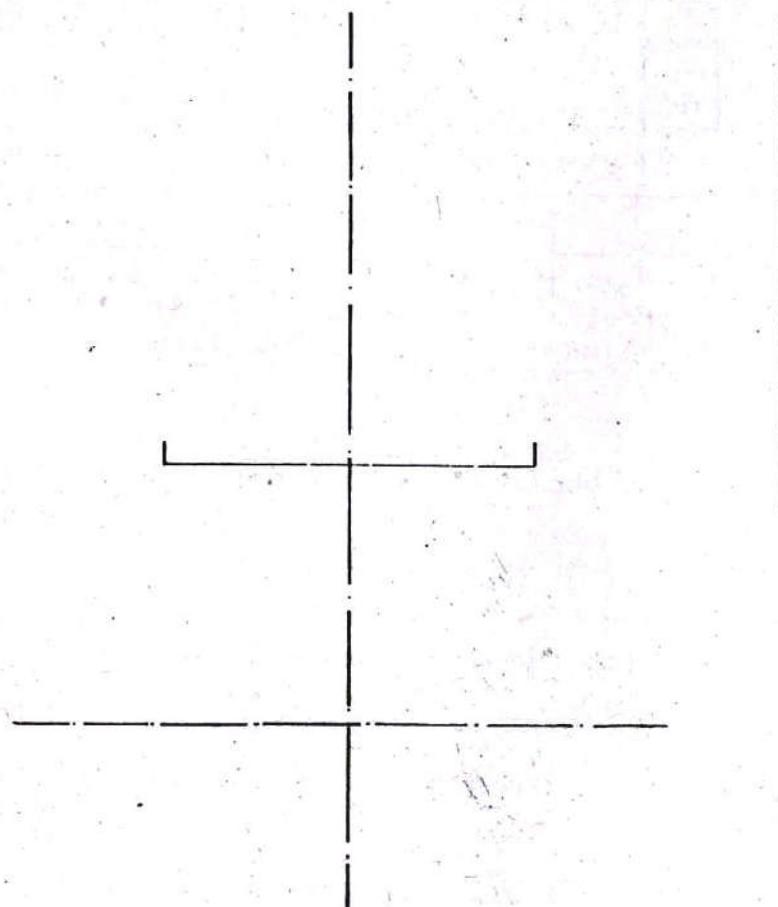
Exercise:

Draw the 'Coupling Half' in 3 views without dimensions, side view sectioned, in a free hand sketch.

Scale 1:1

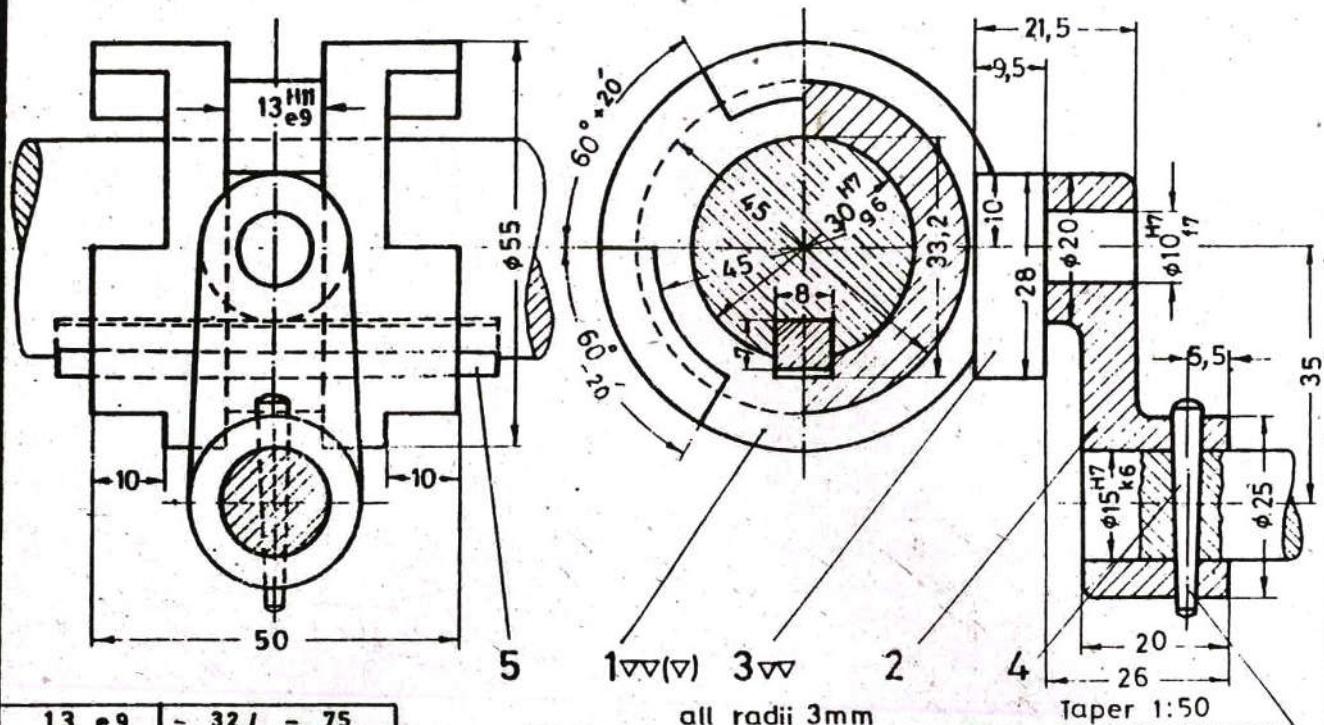


Note: For the elevation the workpiece remains in the position given in the above sketch.



Assembled Workpieces

- Reading of drawings -



13 e9	- 32 / - 75
13 H11	+ 110 / - 0
10 f7	- 13 / - 28
10 H7	+ 15 / - 0
15 k6	+ 12 / + 1
15 H7	+ 18 / + 0
30 g6	- 7 / - 20
30 H7	+ 21 / - 0
ISO Symbol	Off-sizes

No.	Description	Material	Item
1	Parallel key 8x7x60	St 60	5
1	Taperd pin 4x30	St 50	4
1	Disconnecting stone	st 42	3
1	Disconnecting lever	GT W-35	2
1	Coupling bush	GG - 22	1
UNCLUTCHING DEVICE		Scale 1:1	

Note: Part 3 (disconnecting stone) is not sectioned in the side view because it is without internal structure and in order to give a better impression of what it looks like.

Exercise:

1. The coupling bush slides on the shaft to engage and disengage the coupling.

How big are a) outer dia and b) inner dia of the coupling bush ?

a)mm b)mm

How wide is the slot in which the disconnecting stone(part 3) slides ?

.....mm

2. Which type of fit is to be provided for the joint between parts 2 and 3 ?

.....

Why is this necessary ?.....

.....



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 62

Assembled Workpiece

-Preparation of detail drawings -

Exercise: Draw parts 1,2,3 of the Unclutching Device as single parts in elevation and side view, (side view of part 2 sectioned). Enter all dimensions.

Part 1

Part 2

Part 3

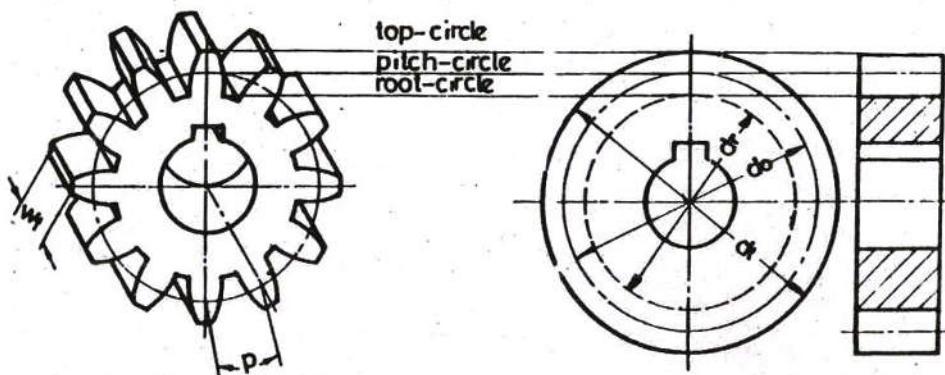


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 63

Representation of Gears I



Note: Technical representation of gear wheels does not show the single teeth.

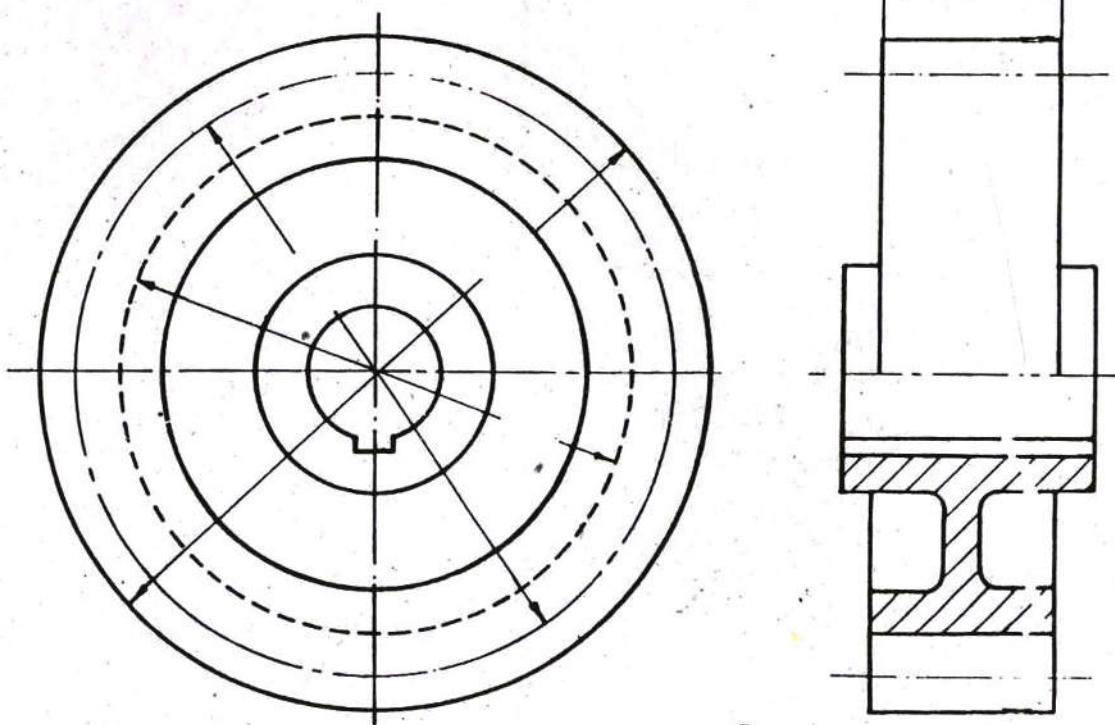
Exception: When the drawing is used for gear wheel production.
Then however normally a few teeth are shown in an enlarged detail.

Drawings of gear wheels must give the following dimensions:

d_t = dia of top circle T = number of teeth (e.g.: $T = 20$)
 d_o = dia of pitch circle w_f = width of face
 m = module (e.g.: $m = 6$)

Sometimes also the root dia., d_r , is given.

Exercise: Enter the missing letters in the drawing below. Scale 1:1.



m = 5
t = 16



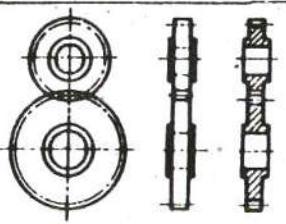
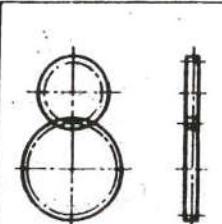
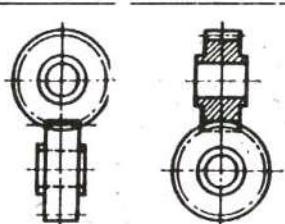
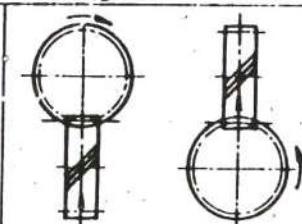
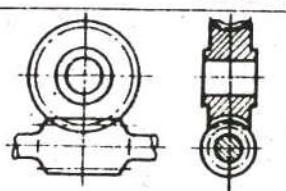
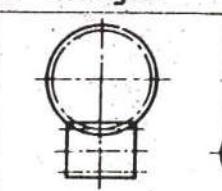
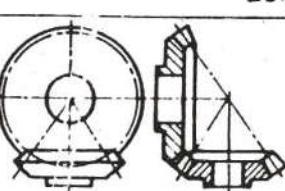
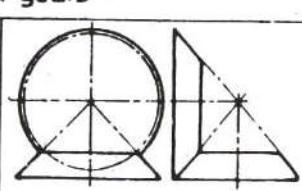
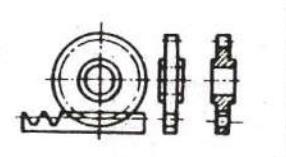
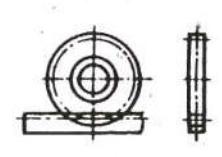
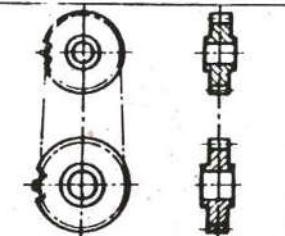
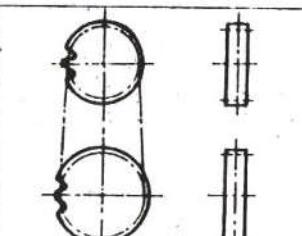
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

**Technical
Drawing
No. 64**

Representation of Gears II

-Symbols-

Tech. Representation	Simplified Represent.	Tech. Representation	Simplified Represent.
Spur gears		Helical gears on shafts at angles from each other	
			
Worm and Wormgear		Bevel gears	
			
Spur gear with Gear rack		Chain wheels	
			

Exercise: Draw a pair of spur gears in two ways:

- a) a technical representation (sectioned) and
- b) in simplified representation.

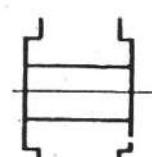
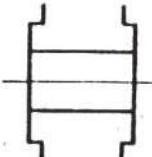
Dimensions of the pinion (small gear): $d_t = 69\text{mm}$; $d_o = 63\text{mm}$; $d_r = 56\text{mm}$; $T=21$

Dimensions of the large gear:

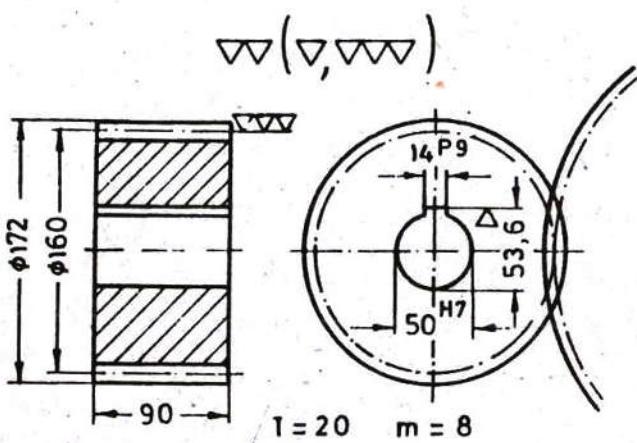
$d_t = 105\text{mm}$; $d_o = 99\text{mm}$; $d_r = 92\text{mm}$; $T=33$

$m = 3$; $W_f = 25\text{mm}$; Scale: 1:2.5

Enter all necessary dimensions !

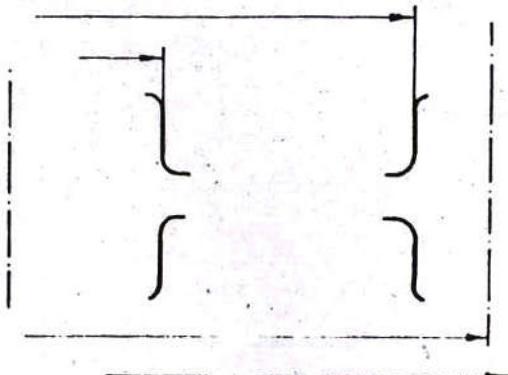


Representation of Gears III



Exercise: The picture shows a pinion in scale 1:5. Draw the corresponding spur gear which shall result in a transmission ratio 2:1 in front view (sectioned) and top view (scale 1:2,5). Enter all necessary dimensions.

Some important hints are given below (i.e. centre line, pitch, hub and hub keyway). The flange between hub and tooth ring has 4 holes of Ø 70 on a hole circle of Ø 186.



all Radii $r = 4$

64,3



$\sim(\nabla,\nabla\nabla,\nabla\nabla)$

$T = \quad m =$



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 66

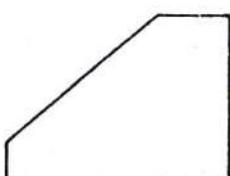
Angular Cuts on Prisms

Exercise: Sketch the side view of each of these objects.

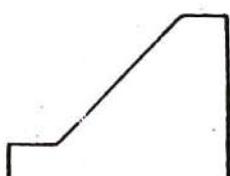
1



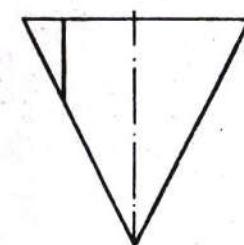
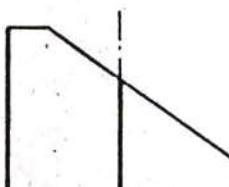
2



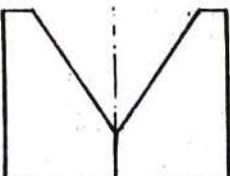
3



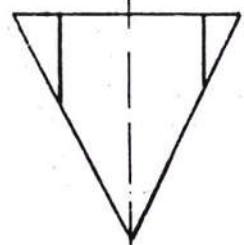
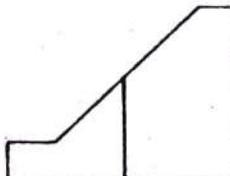
4



5



6



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

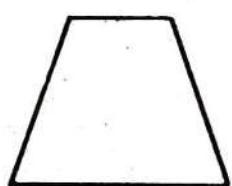
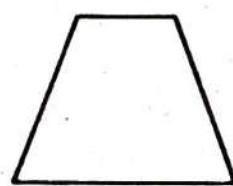
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 67

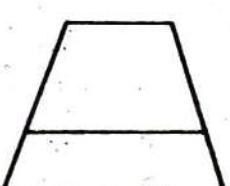
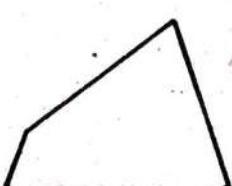
Angular Cuts on Pyramids

Exercise: Complete the plan view of each of these objects (sketch).

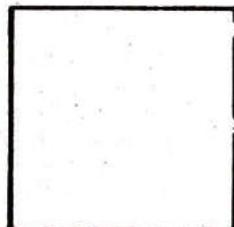
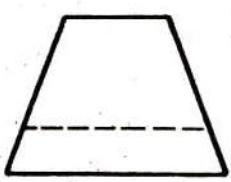
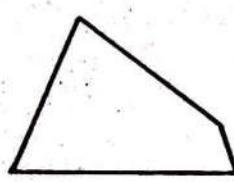
1



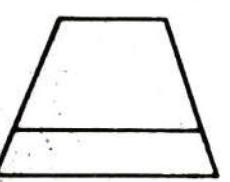
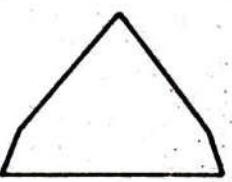
2



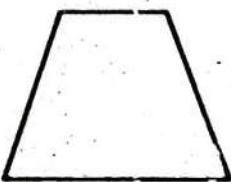
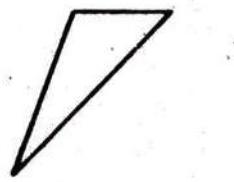
3



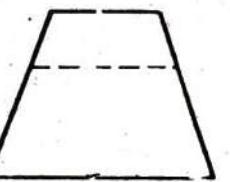
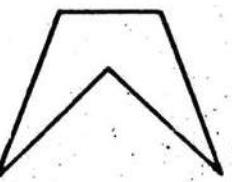
4



5



6



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

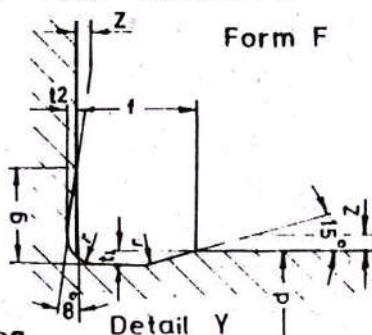
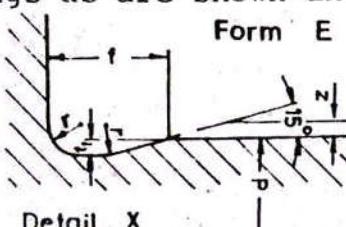
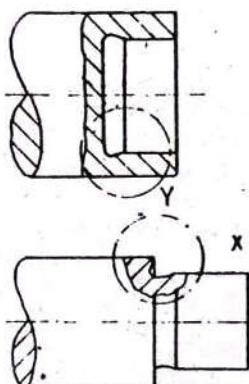
Technical
Drawing
No. 68

Internal and External Recess

Recesses are usually represented in either of the two possibilities shown below.

I. Complete Representation

If complete Representation is chosen, all necessary dimensions are given in enlarged detail drawings as are shown in 'Detail Y' and 'Detail X'

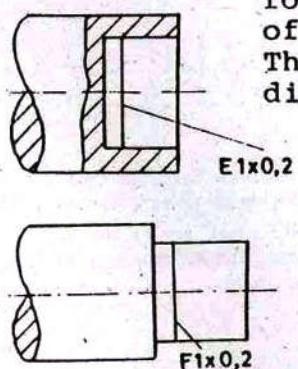


Note: The machining allowance 'z' has to be added for the grinding operation and is taken from tables.

II. Simplified Representation

If simplified Representation is chosen, the dimensions of the recess have to be taken from a table. In this case the drawing contains designation of form (letters "E" or "F") and the size ($r \times t_1$) of the recess.

The detail drawings on top of this sheet show the difference between Form E and Form F.

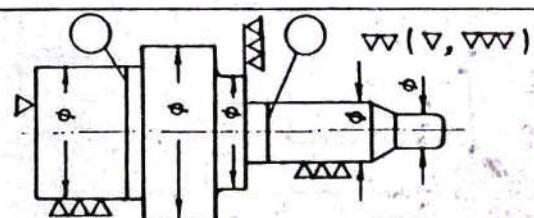
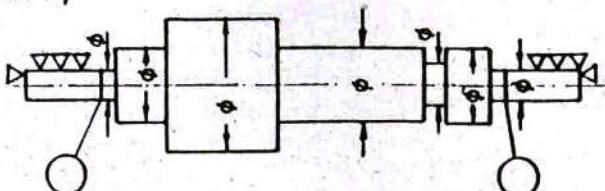


d over	t ₀	r	t ₁ +0,1	f	g ≈	t ₂ +0,05
-	1,6 3	0,1 0,2	0,1 0,1	0,5 1	0,8 0,9	0,1 0,1
16						
3	10	0,4	0,2	2	1,1	0,1
10	18	0,6	0,2	2	1,4	0,1
18	80	0,6	0,3	2,5	2,1	0,2
over 80	1	0,4	4	3,2	0,3	

Exercises:

1. Recess 'Form E' is used if
.....
2. Recess 'Form F' is used if
.....
3. Enter the correct letter (E or F) for the form of the recess of the workpieces in the circles.

vv(v, vvv)



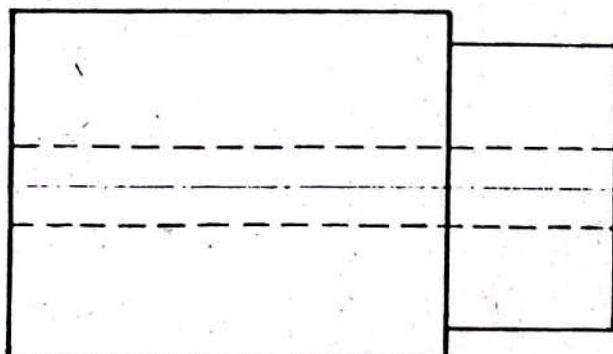
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 69

Dimensioning according to Machining Process

- Turning I -

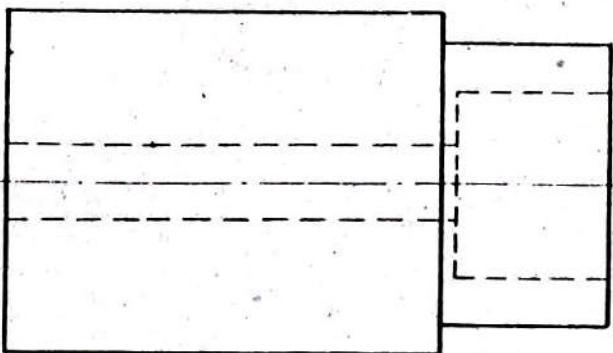


Exercise:

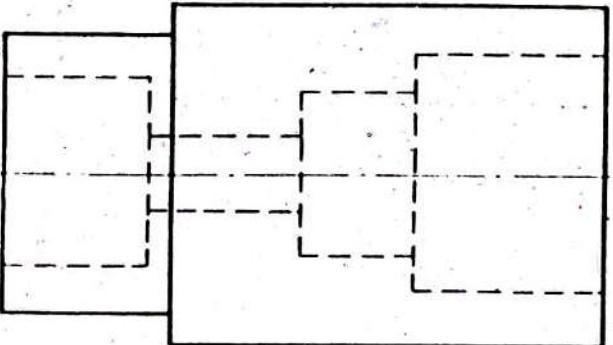
Complete the section view of the turned workpiece with the dimensions acc. to the given sequence of the machining process.

Sequence of operations

- 1.-Boring \varnothing 10 mm
- Roughing to \varnothing 46 mm
- Roughing to \varnothing 37 mm,
length 22 mm

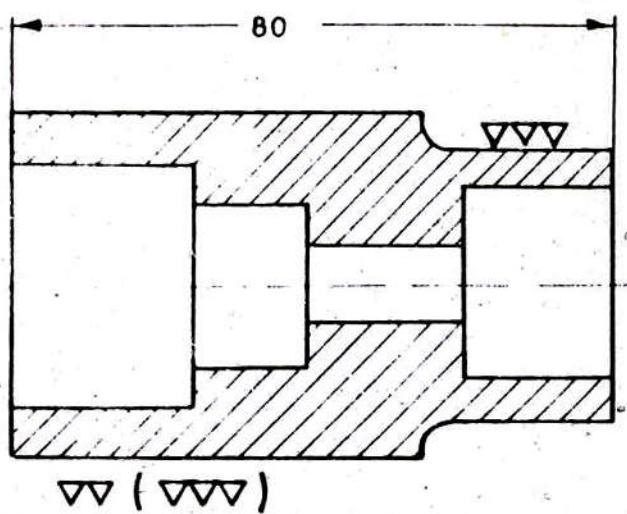


- 2.-Internal turning
 \varnothing 25 mm, 20 mm deep



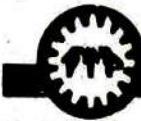
- 3.-Reclamping

- Internal turning
 \varnothing 22 mm, 40 mm deep
- Internal turning
 \varnothing 32 mm, 25 mm deep
- Finishing
outside dia 45 mm



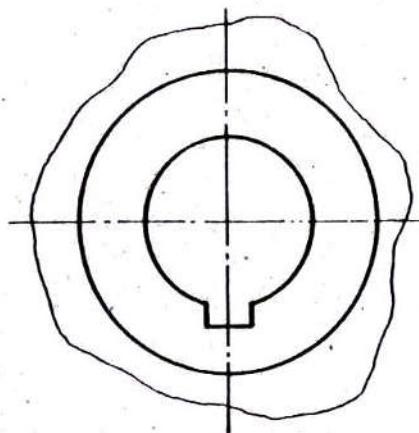
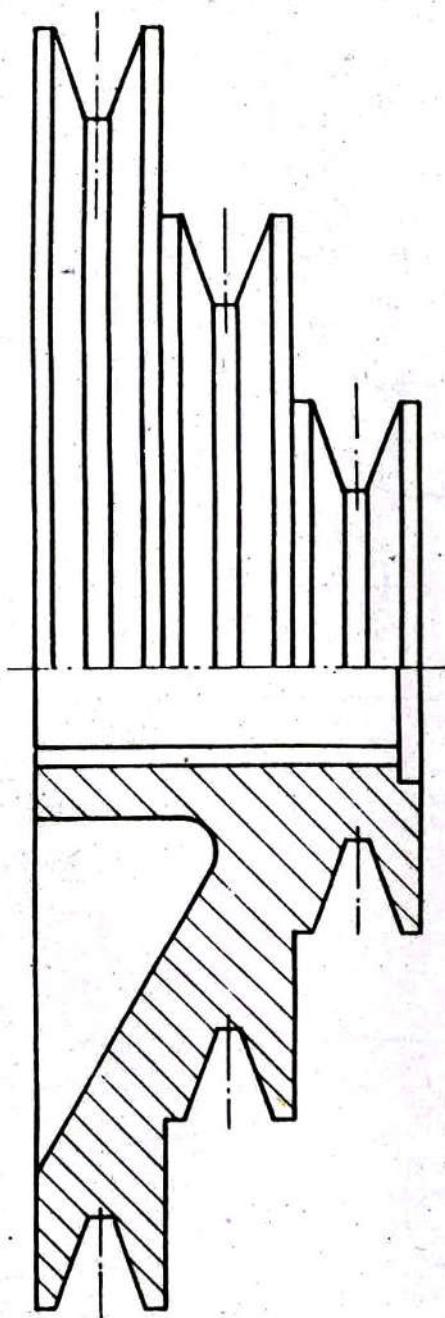
- 4.-Reclamping

- Finishing \varnothing 36 mm,
length 23 mm
- Turning of radius
 $R = 3$ mm



Dimensioning according to Machining Process

- Turning II -



VEE - PULLEY

SCALE 1:1

Exercise: Enter all dimensions in accordance with the machining process.
Find the correct surface symbols.



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 70.1

Dimensioning according to Machining Process

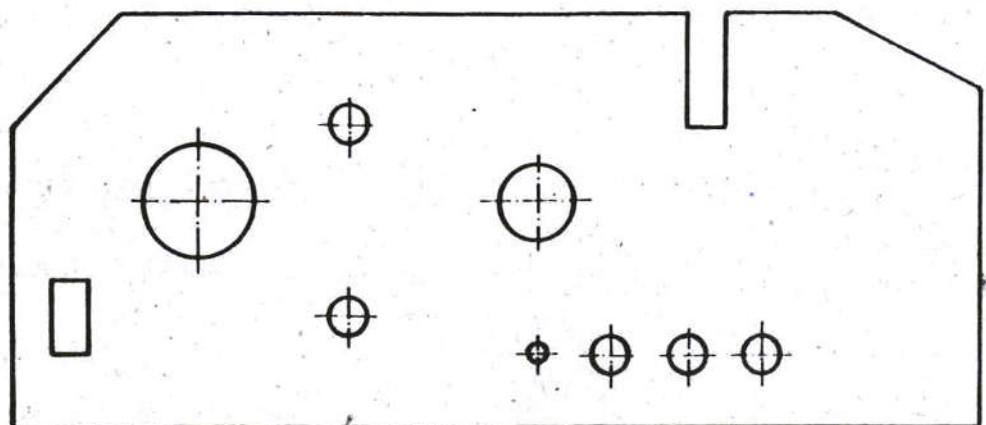
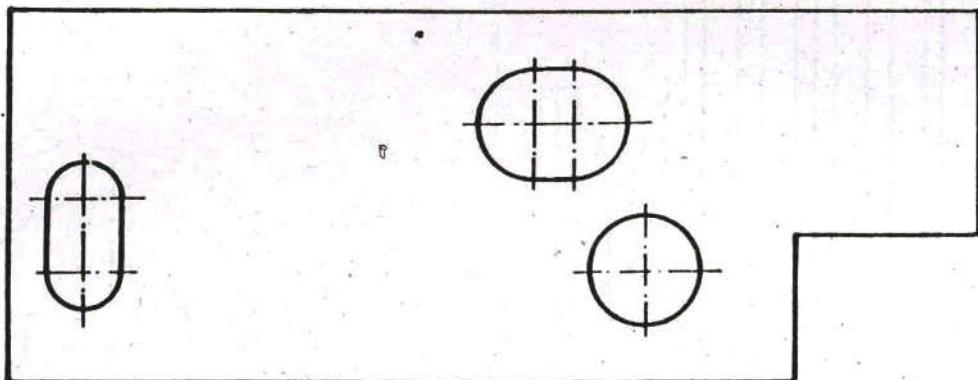
- Drilling I -

Note:

- Dimensioning of holes has to be done under consideration of production method and tools.
- The dimensions can be entered from two reference edges or from the centre line. They can refer either to the centre point or to the edge of the hole, (e.g. in case of milled oblong holes).
- Thickness of the material (sheet metal) shall be given on the workpiece; if there is not enough space it is written beside the drawing.

Exercise:

Enter all dimensions in accordance with the production requirements (thickness: 3 mm).



Scale 1:1



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

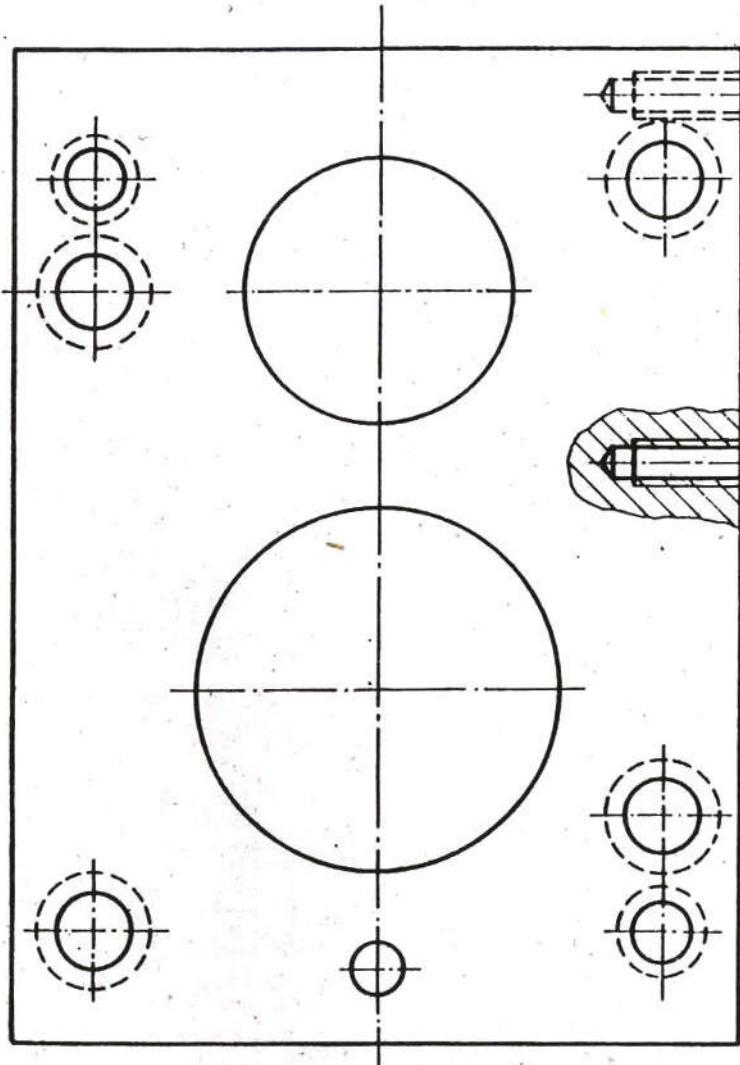
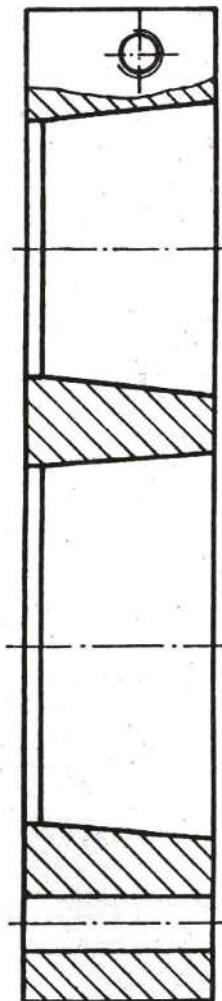
PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 71

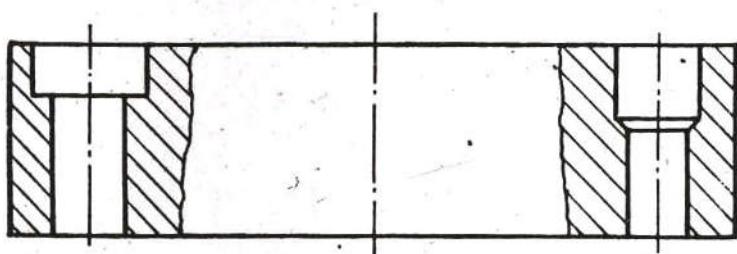
Dimensioning according to Machining Process

- Drilling II -

Exercise: Enter all dimensions according to marking and drilling operations. Find the correct surface symbols.



PIECE PART
Thickness = 2 mm
Material St 42
Thus: $\tau_B = 34 \text{ kp/mm}^2$
Cutting Clearance = 0.12 mm



PIERCING DIE

SCALE 1:1



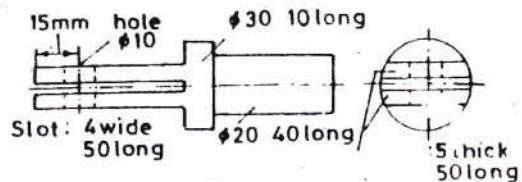
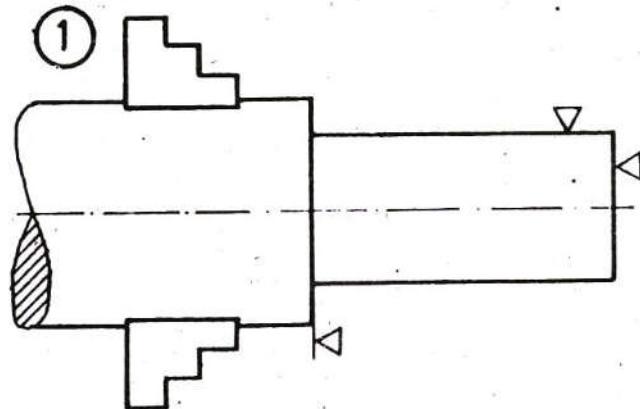
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 72

Dimensioning according to Machining Process

- Turning, drilling, milling -

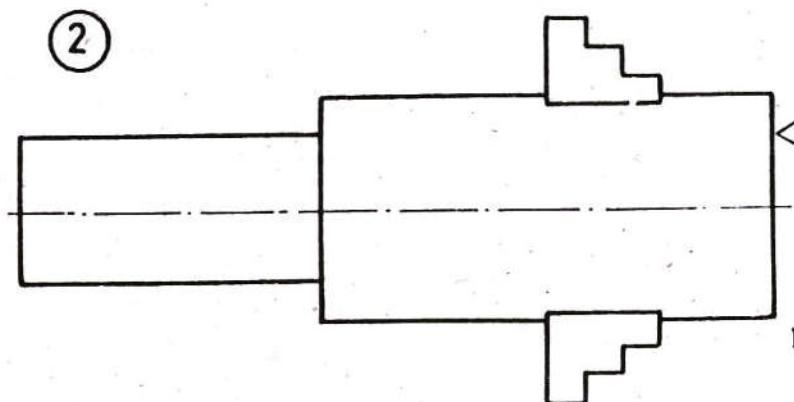


CLAMPING PIECE

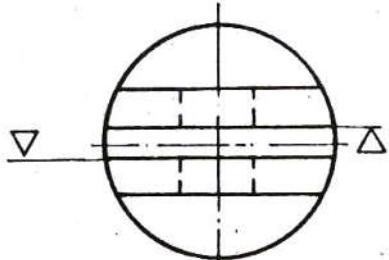
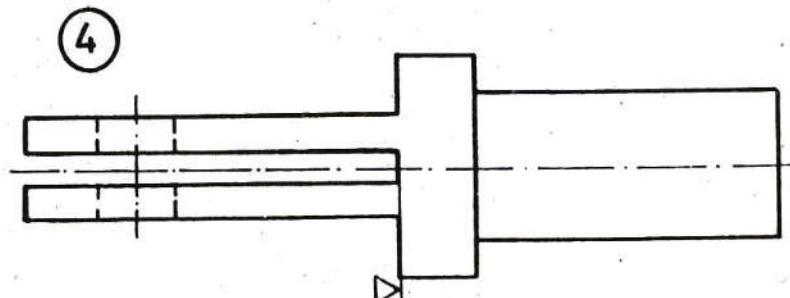
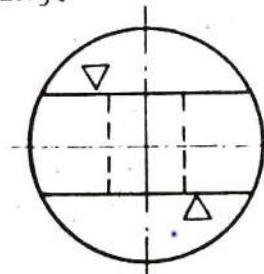
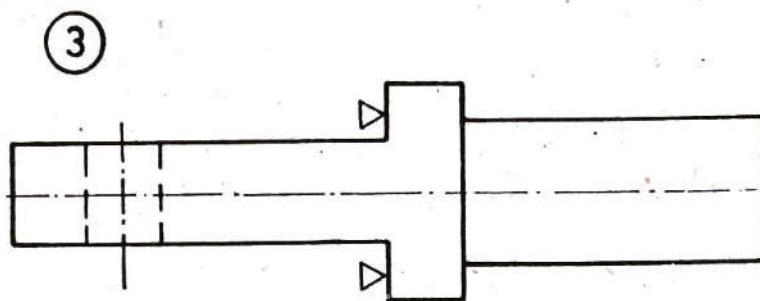
Exercises:

- a) Fill in the sequences of operation as indicated by the four drawings

1.
2.
3.
4.
5.
6.
7.

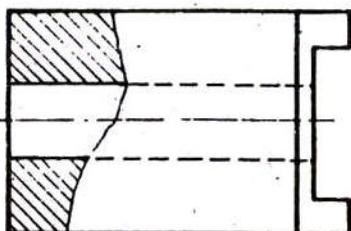


- b) Enter the dimensions, relevant for every single machining operation in the respective drawing.

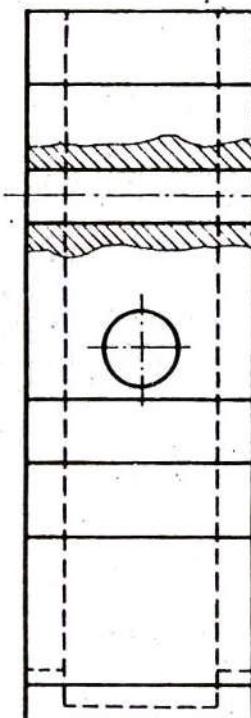
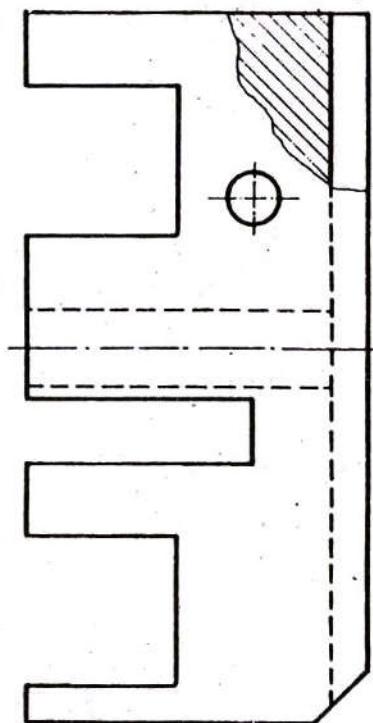


Dimensioning according to Machining Process

- Milling -



SLIDING PIECE
Scale 1:1



SLIDING PIECE

SCALE 1:1

Exercise: Enter all dimensions according to the requirements of the milling operations.

Surfaces: sides of the three deep grooves: ▽▽▽

bottom of flat groove: ▽

all others: ▽



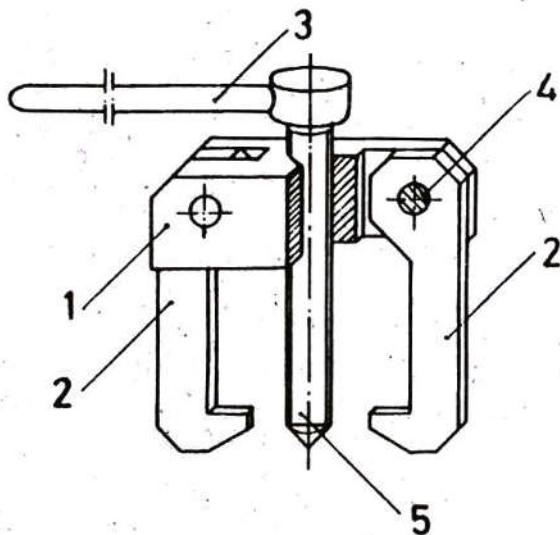
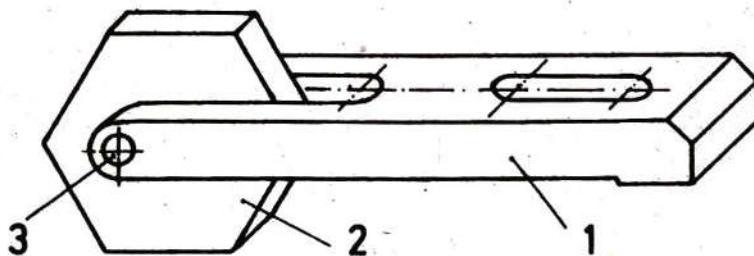
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 73.1

Drawing from Models**- P u l l e r -**Exercise:

- I. Draw the elevation view of the assembled puller in scale 1:1 from model.
Half section as shown.
- II.-Draw parts 1,2,3 and 5 in as many views as necessary; scale 1:1.
-Enter all dimensions and other information which are needed for production.
-Prepare the complete list of parts.

**- C l a m p i n g P i e c e -**Exercise:

- I. Draw the complete Clamping Piece in such a way that all important portions can be recognized; scale 1:1.
- II.-Draw parts 1 and 2 in as many views as necessary; scale 1:1.
-Enter all dimensions and other informations needed for production.
-Prepare the list of parts.

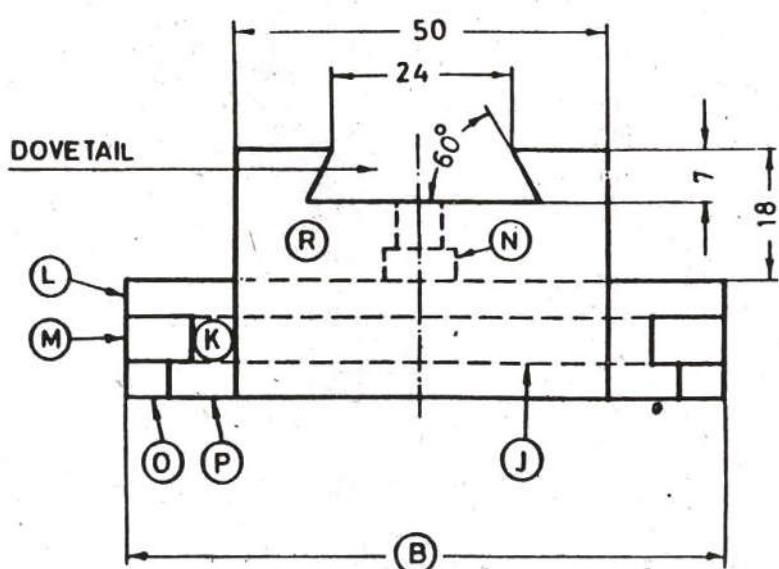
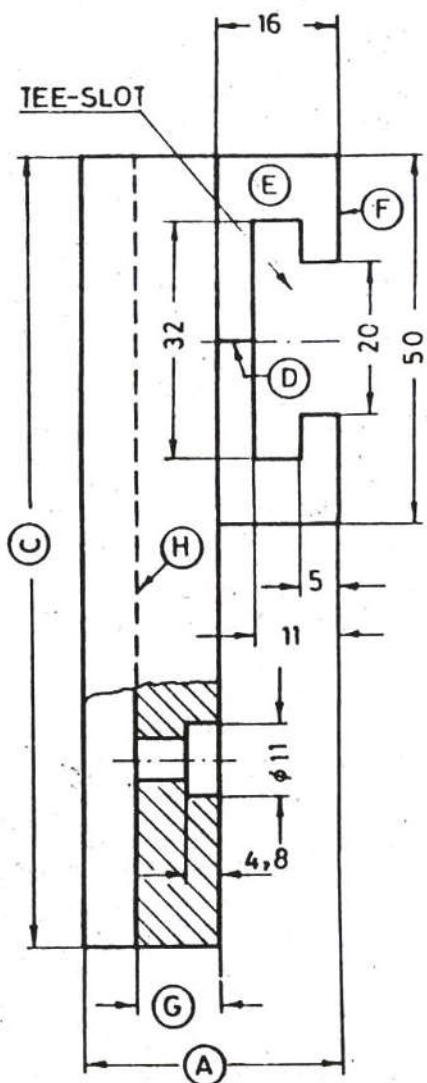
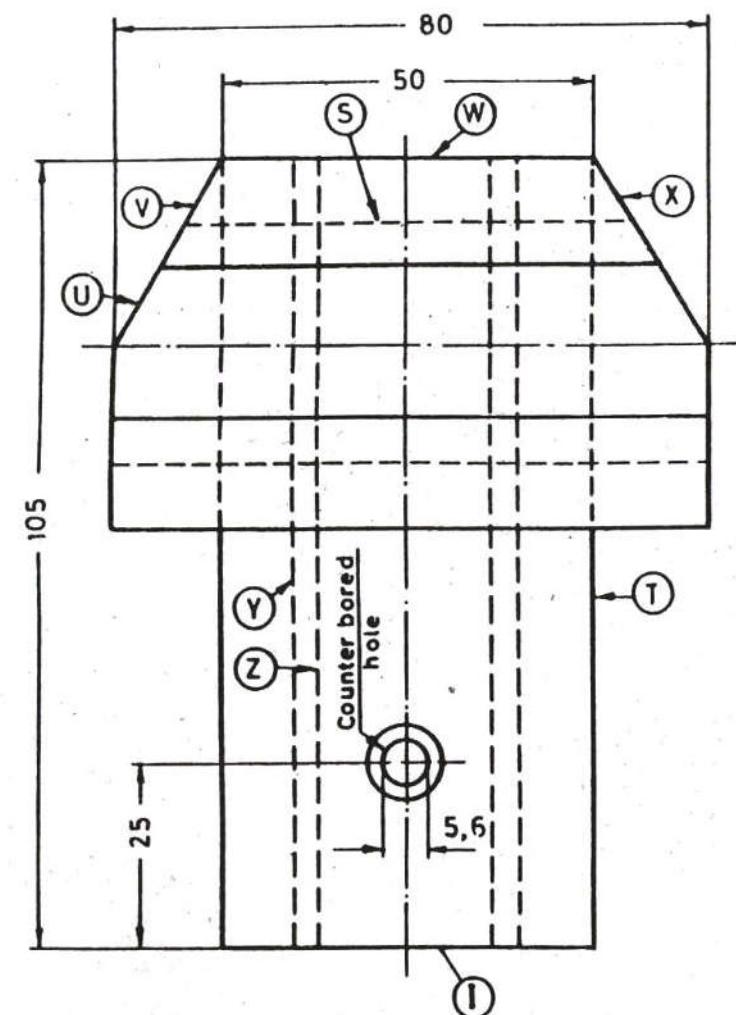


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
Nos. 74/75

Reading of Drawings I



DOVETAILED GUIDE

SCALE 1:1

Exercise see sheet No. 76.1

Reading of Drawings I

(Dovetailed Guide)

Exercise: Answer the following questions with the help of the drawing on sheet No. 76.

1. The overall thickness of the dovetailed slide is:

$$A = \underline{\hspace{2cm}} \text{ mm}$$

2. The maximum length of the tee-slot is:

$$B = \underline{\hspace{2cm}} \text{ mm}$$

3. The overall length of the dovetail is:

$$C = \underline{\hspace{2cm}} \text{ mm}$$

4. The overall depth of the counter-bored hole is:

$$G = \underline{\hspace{2cm}} \text{ mm}$$

5. The depth of the counter-bore is:

$$\underline{\hspace{2cm}} \text{ mm}$$

6. The diameter of the counter-bore is:

$$\underline{\hspace{2cm}} \text{ mm}$$

7. By what line is the wall of the counter-bore represented in the plan view?

line

8. The edge "D" in the side view is represented by what edge in the plan view?

$$\text{edge } \underline{\text{D}} \text{ (side)} = \text{edge } \underline{\hspace{2cm}} \text{ (plan)}$$

9. The surface "E" in the side view is represented by what surface in the plan view?

$$\text{surf. } \underline{\text{E}} \text{ (side)} = \text{surf. } \underline{\hspace{2cm}} \text{ (plan)}$$

10. The edge "F" in the side view is represented by what edge in the plan view?

$$\text{edge } \underline{\text{F}} \text{ (side)} = \text{edge } \underline{\hspace{2cm}} \text{ (plan)}$$

11. The edge "H" in the side view is represented by what edge in the elevation?

$$\text{edge } \underline{\text{H}} \text{ (side)} = \text{edge } \underline{\hspace{2cm}} \text{ (elev)}$$

12. The surface "R" in the plan view is represented by what edge in the elevation?

$$\text{surf. } \underline{\text{R}} \text{ (plan)} = \text{edge } \underline{\hspace{2cm}} \text{ (elev)}$$

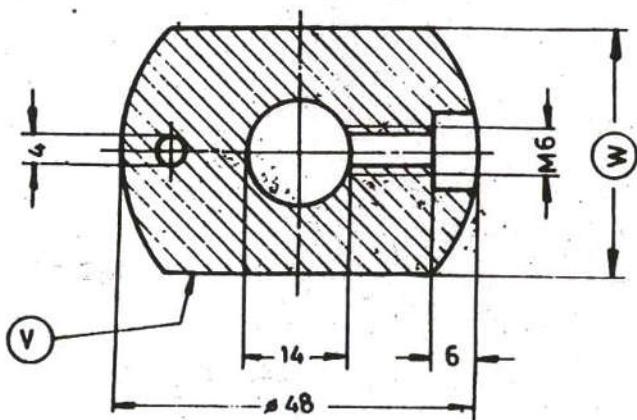
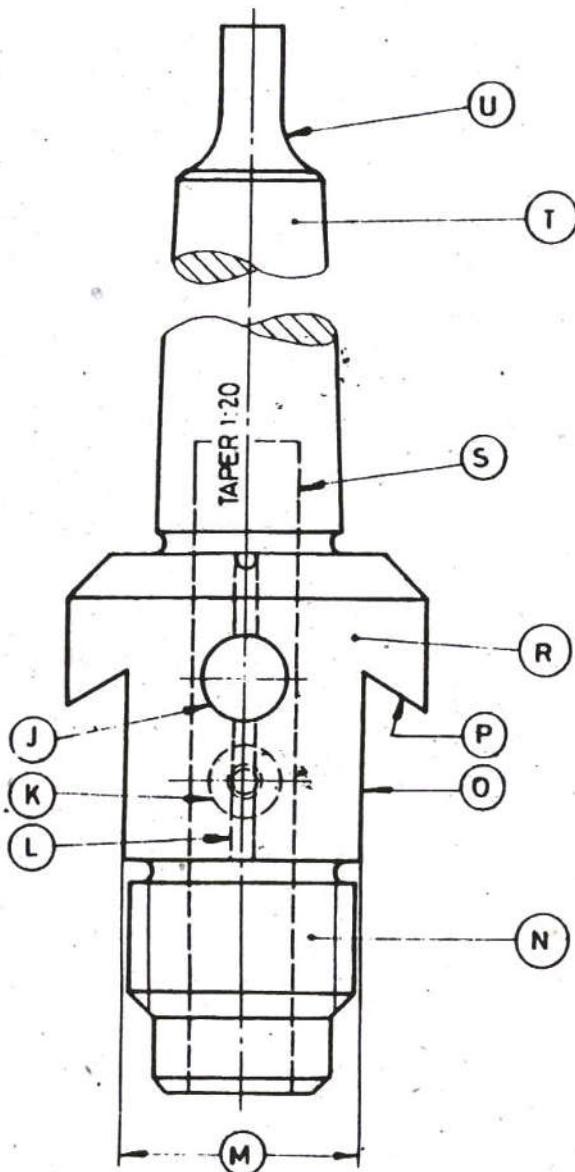
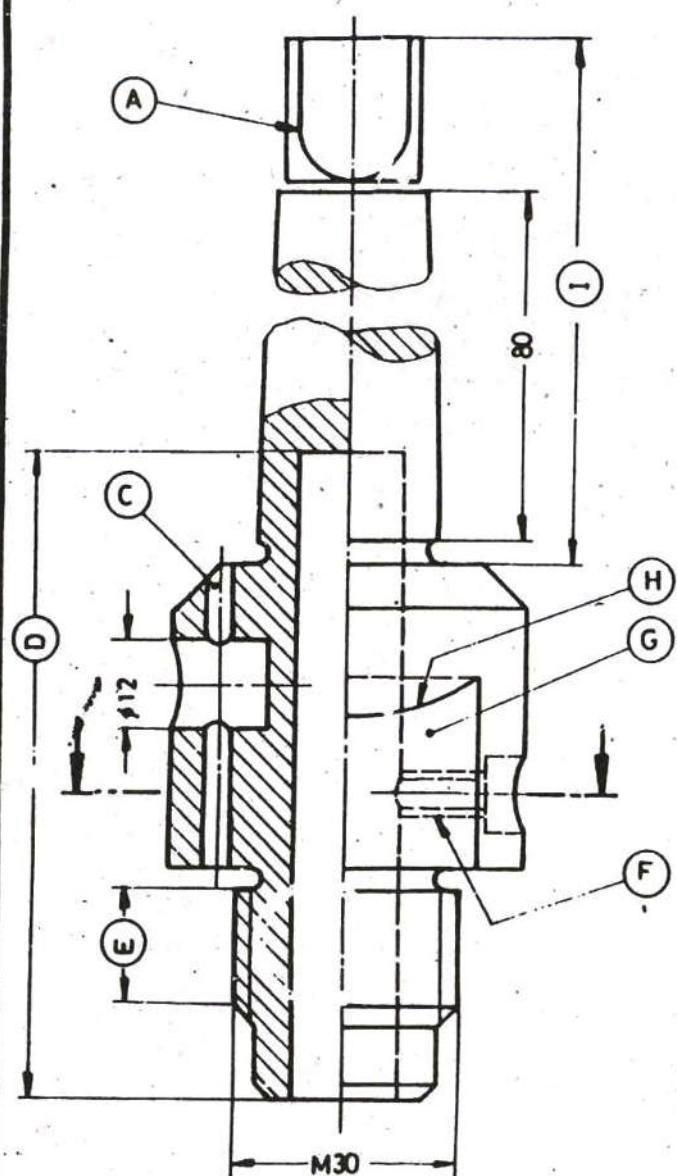
13. The edge "P" in the plan view is represented by what edge in the elevation?

$$\text{edge } \underline{\text{P}} \text{ (plan)} = \text{edge } \underline{\hspace{2cm}} \text{ (elev)}$$

14. The edge "J" in the plan view is represented by what line in the elevation?

$$\text{edge } \underline{\text{J}} \text{ (plan)} = \text{edge } \underline{\hspace{2cm}} \text{ (elev)}$$

Reading of Drawings II



**HOLDER FOR
CIRCULAR CUTTER**

SCALE. 1:1

Exercise see sheet No. 77.1



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Technical
Drawing
No. 77

READING OF DRAWINGS II (Circular Cutter)

Exercise: Answer the questions with the help of the drawing on sheet No. 77.

1. The circular cutter has a tapered shank.
The shank is marked by letter
2. The overall length of the shank is given by dimension _____
3. The taper ratio of the tapered portion is
4. The length of the taper is mm
5. The edge "U" in the side view is represented in the elevation by line
6. The diameter of the cylindrical portion "R" is . . . mm
7. The cylindrical portion has been cut out. The cut out is represented in the side view by the lines . . . and
8. The dimension "M" in the side view is equal to what dimension in the plan view ?
9. The flat surface "G" in the elevation is represented in the side view by line
10. The flat surface "G" in the elevation is represented in the plan view by line
11. The edge "P" in the side view is represented in the elevation by line
12. The type of thread on portion "N" is specified by the dimension
13. The length of the external thread is given by dimension _____
14. The diameter of the blind hole in the centre of the circular cutter is mm
15. The overall length of the blind hole in the centre is given by dimension
16. The wall of the blind hole in the centre is represented in the side view by line
17. A counter-bored hole with internal thread is represented in the elevation. The thread is marked with letter _____
18. The thread cut in this hole is specified by dimension _____
19. The depth of the counter-bore on this threaded hole is mm
20. The counter-bore on the threaded hole is represented in the side view by line
21. A blind hole which is cut into the side of the cylindrical portion is represented in the elevation.
The diameter of this blind hole is mm
22. This blind hole is represented in the side view by line _____
23. The hole Ø 4 (plan view) is represented and marked in the elevation by letter
24. The hole Ø 4 is represented and marked in the side view by letter



